

Having thus, described the invention, what is claimed is:

1. A hydraulic swash plate plunger unit, comprising:

a rotatably supported casing having a central axis of rotation and comprising an outer wall comprising a rotationally asymmetrical balance portion,

a swash plate member installed in the casing and inclined at a predetermined angle with respect to the central axis of rotation,

a cylinder which is rotatably installed in the casing and has a plurality of plunger holes formed therein extending in an axial direction and arranged in a cylindrical pattern around the central axis of rotation, and

a plurality of plungers which are slidably disposed in the respective plunger holes;

wherein the casing is adapted to be rotated relative to the cylinder, so that the outer end portions of the plungers are sequentially pushed in an axial direction by the swash plate member to reciprocate the plungers in the plunger holes,

and wherein said rotationally asymmetrical balance portion is integrally formed with the outer wall of the casing to balance the rotation thereof.

2. The hydraulic swash plate plunger unit of claim 1, wherein said casing comprises a

cylindrical mating portion formed on the outer wall thereof for aligned attachment to an input gear member.

3. The hydraulic swash plate plunger unit of claim 2, wherein said casing further comprises a flange portion formed adjacent the end of the cylindrical mating portion, and wherein said flange portion comprises said rotationally asymmetrical balance portion.

4. The hydraulic swash plate plunger unit of claim 1, wherein said rotationally asymmetrical balance portion is formed in an irregular polygonal shape.

5. The hydraulic swash plate plunger unit of claim 4, wherein said rotationally asymmetrical balance portion has five sides.

6. A hydraulic swash plate plunger pump adapted to be rotatably disposed within a transmission housing and comprising:

a rotatably supported pump casing having a central axis of rotation and  
comprising an outer wall comprising a rotationally asymmetrical balance portion;

a pump swash plate member disposed within said pump casing; and

a pump cylinder disposed within said pump casing and having a plurality of pump plunger holes formed therein to slidably receive a plurality of pump plungers;

wherein the pump casing is adapted to be rotated relative to the pump cylinder, so that the outer end portions of the pump plungers are sequentially pushed in an axial direction by the pump swash plate member to reciprocate the plungers in the plunger holes,

and wherein said rotationally asymmetrical balance portion is integrally formed with the outer wall of the pump casing to balance the rotation thereof.

7. The hydraulic swash plate plunger pump of claim 6, wherein said casing comprises a cylindrical mating portion formed on the outer wall thereof for aligned attachment to an input gear member.

8. The hydraulic swash plate plunger pump of claim 7, wherein said casing further comprises a flange portion formed adjacent the end of the cylindrical mating portion, and wherein said flange portion comprises said rotationally asymmetrical balance portion.

9. The hydraulic swash plate plunger pump of claim 8, wherein said rotationally

asymmetrical balance portion is formed in an irregular polygonal shape.

10. The hydraulic swash plate plunger pump of claim 9, wherein said rotationally asymmetrical balance portion has five sides.

11. A hydraulic continuously variable transmission, comprising:

a hollow transmission housing;

a motor casing disposed within said transmission housing

a motor pivot member supported by said motor casing;

a swash plate plunger pump disposed within said housing and comprising:

a rotatably supported pump casing having a central axis of rotation and comprising an outer wall comprising a rotationally asymmetrical balance portion;

a pump swash plate member disposed within said pump casing; and

a pump cylinder disposed within said pump casing and having a plurality of pump plunger holes formed therein to slidably receive a plurality of

pump plungers;

a swash plate plunger motor comprising a motor swash plate and a motor cylinder having a plurality of motor plunger holes formed therein to slidably receive a plurality of motor plungers;  
and

an output shaft extending through and supporting said pump cylinder and said motor cylinder, said output shaft being rotatably supported in said housing through a plurality of rotatable bearings;

wherein the pump casing is adapted to be rotated relative to the pump cylinder, so that the outer end portions of the plungers are sequentially pushed in an axial direction by the pump swash plate member to reciprocate the plungers in the plunger holes,

and wherein said rotationally asymmetrical balance portion is integrally formed with the outer wall of the pump casing to balance the rotation of the casing.

12. The hydraulic continuously variable transmission of claim 11, wherein said casing comprises a cylindrical mating portion formed on the outer wall thereof for aligned attachment to an input gear member.

13. The hydraulic swash plate plunger unit of claim 2, wherein said casing further comprises a flange portion formed adjacent the end of the cylindrical mating portion, and wherein said flange portion comprises said rotationally asymmetrical balance portion.

14. The hydraulic swash plate plunger unit of claim 1, wherein said rotationally asymmetrical balance portion is formed in an irregular polygonal shape.

15. The hydraulic swash plate plunger unit of claim 4, wherein said rotationally asymmetrical balance portion has five sides.